

## INTERNATIONAL METEOROLOGY.

International charts iv. and v. accompany the present number of this REVIEW. Chart iv. is published for March, 1880, and continues the series of that chart begun in January, 1877. Chart v. is prepared for June, 1880, and continues the series of that chart from November, 1877. In the description of these charts, much valuable information has been obtained from the "Monatliche Uebersicht der Witterung," published under the direction of Prof. Dr. G. Neumayer, Director of the German Marine Observatory, and from the "Bulletin Mensuel," published by Mr. Marc. Dechreves, of Zi-Ka-Wei, China.

Chart iv. exhibits the mean pressure, mean temperature, and prevailing direction of the wind over the northern hemisphere for the month of March, 1880, as determined from one observation taken each day at 7.35 a. m. or 0.43 p. m. Greenwich mean time.

The first area of mean low barometer appears over the eastern coast of Greenland, the mean pressure at Godthaab being 29.55, prevailing wind nne., force 4. The barometric gradient increases rapidly to the east and southeast, and very slowly in a south and southwest direction.

The second area of low barometer extends over northern Russia, and is central near Archangel, where the mean pressure for the month was 29.54, and the prevailing wind wnw., force 6.

The barometric gradient here increases rapidly to the westward and somewhat slowly to the south and eastward.

A third area of mean low pressure occupies the region of British India, where, in the central provinces, the mean pressure for the month was below 29.77.

Three areas of barometric maxima appear upon the chart, one of which extends over southeastern Siberia, where the greatest mean pressure was 30.26 at Nertschinsk. The isobar of 30.10 extends over the eastern part of Asia and includes the southernmost islands of Japan, while a second area of high pressure (30.20) covers China proper.

A third area of mean high barometer, enclosed by an isobar of 30.20 appears in Europe, over the provinces of Brandenburg and Posen and extending to Austria. The isobar of 30.10 extends from the Black Sea northwestward to the Baltic and westward to the North Sea and western coasts of Europe.

In the North America the high area of the Pacific extends over the north Pacific coast regions, where the pressure ranges from 30.11 to 30.16.

Compared with the preceding month, the barometric pressure has increased over Greenland, where the mean is .13 inch above the mean for February. The area of low barometer, then central east of Iceland, has apparently moved eastward with increasing pressure, and is now central over northern Russia, where the barometer is .21 inch below the mean for the previous month. The pressure has also decreased southward and eastward of this area, the means being about .25 inch below those for February.

In eastern Asia, the mean pressure has averaged about .3 inch below the mean for February.

In the United States, the pressure has decreased in all parts of the country, except in the lake region, where it has increased about .1 inch. The isobar of 30.20 which extended over the states of Georgia, Alabama, Tennessee, and parts of North Carolina, and Florida, is this month replaced by the isobar of 30.10.

Compared with the corresponding month of previous years, the pressure was slightly above the normal, north of latitude 35° and from the one hundredth meridian eastward to the Atlantic. In the South Atlantic and Gulf States, a slight deficiency occurred, and on the Pacific coast the pressure was about .03 inch above the normal.

The following table exhibits the mean pressure and the mean temperature for the month of March, 1880, in the several countries of Europe and Asia, compared with the means as

determined from observations taken during March, in the years 1877, 1878, and 1879:

Countries.	Barometer.		Temperature.	
	Mean, March, 1877, 1878 and 1879.	Mean, March, 1880.	Mean, March, 1877, 1878 and 1879.	Mean, March, 1880.
Algeria.....	30.06	30.11	61.8	64.1
Austria.....	29.88	30.15	43.0	43.9
British Isles.....	29.98	30.05	44.3	48.2
Denmark.....	29.74	30.13	36.5	40.4
France.....	29.98	30.10	50.5	58.8
Germany.....	29.80	30.16	39.9	44.2
India.....	29.76	29.81	84.9	85.6
Italy.....	29.82	30.13	54.4	55.1
Norway.....	29.70	30.02	34.3	39.7
Portugal.....	30.07	30.07	58.6	60.3
Russia.....	29.83	29.93	34.2	29.7
Spain.....	30.05	30.08	57.6	61.8
Sweden.....	29.73	29.96	29.1	33.2
Turkey.....	29.92	30.09	54.2	50.9

The accompanying table shows the deviations in temperature and pressure at isolated stations for the month of March, 1880, as compared with the means of three years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

STATION.	Mean Temperature.			Mean Barometer.		
	March, 1877-79.	March, 1880.	Departure.	March, 1877-79.	March, 1880.	Departure.
York Factory.....	-11.1	-18.8	-7.7	29.90	30.01	+0.02
Godthaab.....	20.1	16.9	-3.2	29.72	29.95	+0.17
Stykkisholm.....	29.9	28.1	+1.8	29.65	29.69	+0.04
Tromsø.....	28.4	28.0	+0.4	29.54	29.78	+0.24
Thorshavn.....	37.7	43.9	+6.2	29.75	29.95	+0.20
Archangel.....	28.3	18.1	+10.2	29.70	29.54	+0.16
Katerinburg.....	18.0	18.5	-0.5	29.97	29.55	+0.42
Bernaul.....	28.2	14.3	+13.9	30.27	30.04	+0.23
Yeniseisk.....	22.8	23.7	-0.9	30.17	30.00	+0.17
Nikolaievsk on the Amur.....	8.1	9.3	-1.2	30.23	30.22	+0.01
Zi-Ka-Wei.....	44.6	44.6	Normal	30.23	30.22	+0.01
Pekin.....	42.9	44.1	-1.2	30.17	30.19	+0.02
Beirut.....	64.8	59.7	+5.1	29.98	29.97	+0.01
Mauritius.....	81.5	80.6	+0.9	29.95	29.98	+0.01
Port Napier.....	78.5	78.2	+0.3	29.92	29.83	+0.09
Panamariho.....	80.9	78.9	+2.0	30.03	30.00	+0.03
Funchal.....	68.8	64.0	+4.8	30.15	30.13	+0.02
Ponta Delgada.....	69.7	69.3	+0.4	30.25	30.10	+0.15
Bridgetown.....	81.5	75.6	+5.9	29.99	30.00	+0.01
Navassa.....	78.4	76.4	+2.0	30.01	30.06	+0.05
Mellbourne.....	61.9	63.9	-2.0	30.09	29.8	+0.11
Hobart Town.....	65.1	62.1	+3.0	29.95	29.71	+0.24
Astrakhan.....	44.5	29.8	+14.7	29.93	29.99	+0.06
Athens.....	59.2	55.2	+4.0	29.94	30.10	+0.16
Tiflis.....	57.4	45.9	+11.5	29.93	30.02	+0.09
Laghoun.....	62.1	64.9	-2.8	30.09	30.12	+0.03
Fort-de-France.....	77.4	75.0	+2.4	29.90	30.20	+0.30
Lisbon.....	57.9	60.3	-2.4	30.08	30.10	+0.02
Sandwich Mause.....	59.5	42.9	+16.6	29.78	30.00	+0.22
Malta.....	60.8	59.4	+1.4	29.97	29.98	+0.01
Gibraltar.....	61.2	62.4	-1.2	30.04	30.04	Normal
Tashkent.....	59.5	50.9	+8.6	30.29	30.05	+0.15
Cape Town.....	77.0	76.7	+0.3	30.29	30.01	+0.02
Angora.....	58.2	58.3	-0.1	30.24	30.09	+0.15
Agialari.....	57.9	60.1	-2.2	29.92	30.05	+0.13
Free Town.....	87.6	87.3	+0.3	29.91	29.87	+0.04
Madrid.....	56.5	59.9	-3.4	30.02	30.08	+0.04
Nukuss.....	56.5	45.7	+10.8	29.99	30.03	+0.04
Nassau.....	73.0	71.7	+1.3	30.09	30.12	+0.03
Havana.....	72.6	74.2	-1.6	30.09	30.06	Normal
Mexico.....	49.2	61.3	-12.1	29.21	30.12	+0.09
Lahore.....	76.7	86.7	-10.0	29.85	29.78	+0.07
Tokoi.....	42.5	45.1	-2.6	29.99	30.02	+0.03
San Juan de Puerto Rico.....	77.4	75.7	+1.7	30.04	30.11	+0.07

In North America, the temperature has been above the normal, from the interior of the continent, eastward to the Atlantic, except in the New England states and Canadian maritime provinces, where it has been below the normal. At the Rocky mountain stations and on the Pacific slope, it was below the normal. The greatest excess of temperature prevailed in Florida, and the greatest deficiency was reported from the Canadian maritime provinces.

In Europe, the temperature was above the normal, except in Russia. The following are some of the extreme monthly mean temperatures reported at isolated stations:

LOWEST.	Degrees.	HIGHEST.	Degrees.
York Factory .....	-18.8	Freetown.....	87.3
Moose Factory.....	-4.1	Manilla.....	82.8
Fort Garry.....	-1.4	Mauritius.....	80.6
Nikolaievsk on the Amoor.....	+3.3	Paramaribo.....	78.9
Nerischinsk.....	+12.6	Navassa.....	76.4
Godthaab.....	16.9		
Archangel.....	18.1		
Ekaterinburg.....	18.5		
Barnaul.....	24.3		

The prevailing direction of the wind over North America was northwesterly throughout the country east of the Rocky mountains, except in Texas, Florida, and along the south Atlantic coasts, where it was generally southerly; on the north Pacific coast and in the plateau regions, southeasterly; in California and Mexico, easterly; in Canada and the maritime provinces, northwesterly.

In Europe, the prevailing direction of the wind was easterly to northeasterly, except in Denmark, Sweden, and Norway, and the west coast of Germany, where it was westerly. In Algeria, the winds were northeasterly; in Hindostan, they were generally westerly or northwesterly, and in China and Japan, northerly.

The following notes and extracts, descriptive of the meteorological conditions over Europe, for the month of March, 1880, are taken from the "Monatliche Uebersicht der Witterung:"

From the 1st to the 8th of the month, two depressions prevailed over northern Europe, and extended their influence over the greater part of Europe, excepting the southern peninsulas.

During these disturbances, the pressure increased very slowly in the northern quadrants, while in the southern quadrants the increase was very rapid, as shown by the following: On the third the pressure at Shields and at Vestervig was 28.82, and on the same day, at Rochefort and Vienna, it was 30.00. During that day stormy w.s.w. winds prevailed on the coast of Germany, whereas, at Borkum, the wind was light south, with snow and rapidly falling temperature; the same conditions prevailed at Hamburg during the afternoon of the third, but toward night the wind again changed to w.s.w., with greatly increased force, registering at times a velocity of seventy miles per hour.

Equally strong sw. winds occurred at all stations in north Germany, while in the southern sections of the country fresh sw. breezes, with generally clear weather prevailed. At the morning observation of the second, Liverpool and Nottingham reported light sw. wind with snow, and temperature lower than at any other stations in England.

On the morning of the eighth there was a decided change in the distribution of pressure, the barometric minima above referred to being replaced by an area of high and increasing pressure, which continued with slight changes till the end of the month.

The precipitation in Europe was generally below the normal for the month. The rainfall accompanying the storm of the first decade appears to have been excessive in the Rhine provinces where several streams overflowed, causing serious floods and delaying railroad travel. The weather during the second period of the month was unusually dry and clear.

Over the north Atlantic, west of the fiftieth meridian, and north and south of latitude 40°, during the first decade of the month, the weather was stormy, with variable winds and heavy rains.

3d: N. 26°, W. 53°, ne., force 9; heavy squalls; in N. 38°, W. 57°, n.n.w., force 11; hurricane-like squalls, hail, thunder and lightning, high confused sea.

4th: In N. 39°, W. 66°, s.s.w., force 10.

5th and 6th: In N. 40°, W. 62°, s.s.w. 10 to n.n.w. 11; lightning.

8th: In N. 39°, W. 57°, se: force 11; rainy and lightning.

10th and 11th. In N. 40°, W. 52°, s.se. to n.n.w.; force 11; rain and lightning, high cross sea.

Between 50° and 30° west longitude, the weather was generally stormy, with high northerly and westerly winds.

East of the thirtieth meridian, southwesterly winds prevailed, and near the coasts of Europe the weather was generally settled.

During the second and last decades of the month the weather over the ocean was generally stormy, with variable winds, mostly northwesterly, rain, snow, and hail.

Chart v. exhibits the paths of barometric depressions which have been traced from the daily international charts for the month of June, 1880, supplemented by vessel reports from the north Atlantic.

The data received are charted for each day of the month on the charts accompanying "The International Bulletin" for that day, and from these charts and additional reports, the movement of the centres of barometric minima are traced.

Nineteen of the principal storm-areas occurring in the northern hemisphere have thus been traced.

Concerning the general distribution of these depressions, the following is given:

Nine passed over parts of the United States and Canada, five of which are traced to the Atlantic, but in two of these only, viz., numbers ii. and vi., have sufficient data been received to warrant the tracing of a continuous storm across the ocean. The depressions, with two exceptions, were generally ill defined, and exhibited but slight energy.

Four depressions are exhibited over Europe, one of which extends from the interior of Spain in a northeasterly direction, through Central Europe and southern Sweden to the eastern shores of the Gulf of Bothnia. The other, number xii., extends from southwestern France, northeastwardly to Austria. The remaining two appear over northern Europe.

Six depressions are traced in eastern Asia, extending from the coast of China, generally in a northeasterly course over the island of Nippon.

The following brief descriptions are given of the storms first appearing within the limits of the Signal Service stations:

I.—This depression appeared on the morning of the third, near Fort Benton; moving southeastward, the area was central near North Platte on the morning of the fourth. On the fifth, the depression was central near Omaha, the barometer at that station reading 29.11, or .65 inch below the normal. Moving northeastwardly, the storm was central in northern Michigan on the sixth, Escanaba barometer, 29.18. From this point, the centre passed down the Saint Lawrence valley and into the province of Quebec, with decreasing energy. During the passage of this storm very heavy rains and high winds occurred, causing serious damage to shipping on the lakes.

II.—This was apparently central off the coast of British Columbia on the morning of the seventh; following an east-south-easterly course, the centre reached Fort Buford on the eighth; thence, it passed northeastwardly into Manitoba.

III.—This depression first appeared in Colorado on the eighth, where it remained stationary until the eleventh. During that day it passed to the northeast and on the twelfth, was central near Pembina. On the thirteenth the centre was apparently near Parry Sound; barometer 29.61, and on the fourteenth it moved eastward over the Atlantic. Owing to lack of data, its subsequent movement cannot be traced. During the passage of this storm, a violent tornado occurred in Iowa, causing loss of life and great destruction of property. The storm was accompanied by heavy rain and hail.

IV.—This appeared over Nova Scotia on the twelfth, where it remained stationary until the fourteenth. On the morning of the fifteenth, the centre passed off over the Atlantic to about N. 46°, W. 52°. The following vessel reports probably indicate the further movement of this storm: sixteenth, s. s. "Erin" in N. 46°, W. 42°, moderate w. gale, head sea; schr. "Delia Hodgkins" in N. 52° 56', W. 52° 52', barometer, 29.69, n.n.e., force 8; s. s. "Circassian" in N. 47°, W. 41°, strong w. gale, high head sea: seventeenth, s. s. "Bath City" in N. 46°, W. 42°, hard nw. gale, high sea: eighteenth, s. s. "Nederland"

in N. 44° 39', W. 32° 33', w., force 6, high sea: nineteenth, s. s. "City of Chester" in N. 47°, W. 31°, moderate w.n.w. gale; s. s. "Pennsylvania" in 49° 27', W. 20° 41', barometer, 29.45, s.e., force 6, heavy sea: twentieth, s. s. "Braunschweig" in N. 49° 01', W. 17° 49', 29.46, s., force 2; s. s. "Celtic" in N. 50° 15', W. 23° 55', 29.62, n.e., force 4. On the twenty-first, the centre of disturbance was probably over Galway Bay, the barometer at Galway reading 29.52, calm; on the same day, the s. s. "Indiana" in N. 51° 11', W. 16° 17', reported, barometer, 29.55, sw. During the twenty-second and twenty-third, the depression was apparently stationary over the British Isles, where it finally disappeared.

V.—During the thirteenth, the pressure slowly decreased in Kansas, and by the morning of the fourteenth, a decided depression had formed. Moving eastward, the centre of disturbance reached West Virginia on the morning of the fifteenth; it then moved southeastward during the day and passed off the North Carolina coast, over the Atlantic. On the sixteenth, Bark "John Sheppard" in N. 34°, W. 70°, reported fresh sw. gale. This depression occasioned a violent wind and rain storm in Ohio; many buildings, bridges, etc., were destroyed by the heavy floods.

VI.—This storm developed in the St. Lawrence valley on the twenty-first, and moving slowly southeastward through Maine, was central on the twenty-second near Halifax, N. S. In connection with the passage of this area, n.w. winds, ranging in velocity from twenty to forty miles per hour, were reported from various stations on the New England coast.

The following vessel reports probably indicate the eastward movement of this disturbance: twenty-third, s. s. "Nederland" in N. 40° 33', W. 58° 42', barometer 29.51, w.s.w., force 4; bark "A. S. Taylor," in N. 35°, W. 63°, lost sails in a gale; twenty-fourth, U. S. steamer "Alliance," in N. 45° 35', W. 53° 55', 29.59, e.s.e., force 2, light rain; s. s. "Celtic," in N. 42° 36', W. 53° 05', 29.54, n.w., force 3, heavy rain: twenty-fifth, U. S. steamer "Alliance," N. 46° 25', W. 50° 50', 29.49, n.n.e., force 2 to 4; s. s. "Indiana," in N. 43° 03', W. 41° 59', 29.63, w.s.w., force 8, heavy rain: twenty-sixth, s. s. "Victoria," in N. 45° 12', W. 37° 28', strong breeze, head sea; s. s. "Denmark," N. 45° 22', W. 39° 04', strong and increasing sw. wind, high head sea; s. s. "Vaderland," N. 45° 34', W. 37° 28', strong s.s.w. to w. breeze, rain, and high head sea: twenty-seventh, s. s. "Hibernian," N. 51° 05', W. 34° 14', 29.47, w.n.w. This depression appears to have passed northeastward south of Iceland, and on the twenty-eighth, was probably central near Thorshavn, the barometer at that station reading 29.50, wind shifting from s.e. to w. The disturbance continued its northerly course and on the twenty-ninth was central, with increasing pressure near Brono, barometer 29.60, wind W.

VII.—This area developed in northern Minnesota or Manitoba during the twelfth-second, and on the twenty-third was central near Duluth; it passed thence over Lake Superior beyond the stations of observation. This storm was of slight energy, no winds of over twenty-five miles per hour being reported.

VIII.—This appeared in Michigan on the twenty-fourth, and moving in an easterly course the center reached the maritime provinces on the twenty-fifth. On the twenty-sixth it was central near Farther Point, and during the day passed over Cape Breton Island to the Atlantic; the bark "Ivigut" in N. 44° 13', W. 54° 31', reported barometer, 29.78, s.s.e., drizzling.

IX.—This depression first appeared in Manitoba on the twenty-sixth. Moving slowly in an easterly direction it was central over the lakes on the morning of the twenty-eighth, and on the following day reached the province of Ontario; pursuing a northeasterly course it passed down the Saint Lawrence valley and beyond the stations of observation.

In connection with the storms occurring over Europe, some interesting notes have been taken from the "Monatliche Uebersicht der Witterung," published by Professor Dr. Geo. Neumayer, of Hamburg.

X.—The barometer was low in Spain at the beginning of the month, and on the second the depression had extended to France, and was central near Bourges. Moving in a north-easterly course, the centre of disturbance reached Berlin on the third and on the fourth passed over the Baltic to Sweden. During the fourth and fifth the centre passed near Upsala; its course then apparently changed to the eastward and passed over the Gulf of Bothnia. On the sixth it was central near Dorpat; its further movement was not sufficiently defined to admit of its being charted.

XI.—This depression apparently developed north of Scotland on the sixth, barometer at North Unst, Shetland isles, reading 29.49, a fall of .30 inch in twenty-four hours. During that day it moved in a northeasterly course towards the Norwegian coast, and on the seventh was central near Bergen. Its course then changed to the north-northeastward, with increasing pressure during the eighth, ninth and tenth, and on the latter date it disappeared over the Arctic ocean.

XII.—This first appeared in southwestern France on the tenth, and following a course slightly north of east, it reached the southwestern frontier of Germany on the twelfth; it then passed southeastward towards the Black sea, where it disappeared. In connection with this storm, a second depression probably formed, which extended its influence over central Europe, causing unusually heavy rains and thunder-storms.

The following will be found interesting: On the twelfth, a severe thunder-storm, accompanied by heavy rain, burst over the vicinity of Hamburg; trees were uprooted and chimneys blown down. The lightning was unusually severe. In the kingdoms of Prussia and Saxony, as also in Hanover and Westphalia, the storm was equally severe, especially in the latter provinces, where several rivers overflowed, causing disastrous floods; much damage resulted from hail. At Lippstadt, in Westphalia, 137.8 m. m. or 5.425 inches of rain fell in seventeen hours; several washouts occurred on the railroads and bridges were swept away. It may be noted as interesting, that the rainfall at Lippstadt, for the first half of the month under consideration, amounted to 206.2 m. m. or 8.123 inches, while the total rainfall for the month of May was only 14.2 m. m. or 0.55 inch.

The greatest damage to property and loss of life appear to have occurred in Saxony at and in the vicinity of Zittau.

Four hundred and twenty-three dwelling-houses were almost totally wrecked, while a greater number of other buildings were more or less damaged. Reports place the damage to property at \$154,500.

At Oberlausitz, sixty persons lost their lives; a large number of dwellings and other buildings were demolished or damaged. It is impossible to estimate the damage to property.

XII.—This probably developed in the Arctic, and on the seventeenth appeared near Archangel, barometer 29.63, a fall of .50 inch during twenty-four hours. Moving in a southeasterly direction, the centre of disturbance reached Kasan on the eighteenth, barometer 29.32, a fall of .62 inch. The course apparently changed to the eastward and, on the nineteenth, the depression was central near Ekaterinburg, barometer 28.94; on the twentieth, it probably disappeared in the valley of the Obi.

The following general description of the depressions traced along the coasts of China and Japan are given, together with extracts from the "Bulletin Mensuel," published by M. Marc Dechevrens of the Zi-Ka-Wei Observatory:

During the month of June, 1880, incessant rains prevailed over the interior of China; the abundant rainfall of the preceding month gave rise to grave apprehensions concerning the harvest, and during the month under consideration, these fears were realized. In addition to blighted harvests, the province of Canton has suffered severely from disastrous floods; in some instances entire villages with their total population were swept away.

The following comparison of rainfall at Hong-Kong is interesting as showing the unusual amount of precipitation during this month.

In 1877, the June rainfall was 9.37 inches; in 1878, 15.36; in 1879, 11.32, while during the same month in 1880 it reached the exceedingly large amount of 28.06 inches. As a striking contrast to the above, the monthly rainfall at Zi-Ka-Wei and northern stations was below the average, and near the fortieth parallel almost absolute drought prevailed.

In Japan the rainfall was about the average.

The depressions occurring over China and Japan during the month were only of slight energy.

XIV.—This apparently developed near Zi-Ka-Wei on the fifth, and on the sixth was probably central near Nagasaki, the barometer at that station showing a fall of .50 inch. On the seventh the area passed northeastward along the coast of Nippon, and disappeared near latitude 40°. The influence of this depression was probably felt by the ship "Sumatra" on June 7th in N. 33° 50', E. 137° 36', heavy se. to s. gale.

XV.—This depression appeared on the coast of China near the twenty-eighth parallel, and on the ninth was probably central over the Eastern sea, the s.s. "City of Pekin" N. 25°, 19' E. 121° 02', reporting barometer 29.76, ne., force 6, rainy. On the tenth the area disappeared near N. 30°, E. 130°.

XVI.—Probably developed on the fourteenth near N. 29°, E. 116°, and moved in a northeasterly course towards the straits of Corea, where it was central on the fifteenth. It continued its northeasterly course and finally disappeared on the sixteenth.

XVII.—This depression appeared northwest of Pekin on the sixteenth, the barometer at that station reading 29.58. On the seventeenth the center of disturbance was near the Gulf of Pe-Chi-Li; on the eighteenth it passed over Corea and the island of Nippon, and disappeared to the northeast on the nineteenth.

XVIII.—This moved to the eastward over China on the twenty-sixth and twenty-seventh, crossing the Gulf of Pe-Chi-Li on the twenty-eighth, when its course apparently changed slightly to the southward. It passed over the southern part of Nippon and disappeared on the twenty-ninth. The U. S. steamer "Ashuelot," in N. 33° 29', E. 135° 58' reported barometer 29.77, wind e.ne.

XIX.—This appeared on the twenty-ninth and moving eastward was probably central near Zi-Ka-Wei on the thirtieth, barometer 29.55, e.s.e., raining.

#### OCEAN ICE.

April 23d to 27th: Ship "Glory of the Seas," between N. 43° 48' to N. 43° 00', W. 52° 22' passed icebergs and broken ice: 25th: S. S. "Daniel Steinmann," in N. 45° 47', W. 43° 42', passed a large iceberg; on the following day passed sixteen large bergs and field-ice one mile long: 27th: Bark "Pillau," in N. 43°, W. 44°, passed several large icebergs and quantities of field ice.

28th: S. S. "Polynesian," in N. 42° 56', W. 50° 58', passed several icebergs, and on the following day a quantity of field ice.

29th: S. S. "Pensher," in N. 46° 00', W. 46° 30', passed iceberg and field-ice; bark "Alaska" passed quantities of field-ice and one iceberg on southern edge of the banks.

30th: S. S. "Katie," in N. 45° 09', W. 46° 52' passed one iceberg eighty feet high, and several smaller, and on same day in N. 44° 25', W. 48° 30', met large fields of ice very closely packed and stretching a distance of thirty-five miles ne. to sw.

May 1st: S. S. "Adriatic," in N. 44° 12', W. 45° 36', passed a large iceberg. s. s. "Jason," in N. 47°, W. 46°, met ice and remained in it for three days; passed numerous very large icebergs.

3d: S. S. "Egyptian Monarch," in N. 42° 52', W. 48° 46', passed three large icebergs; s. s. "Otranto," in N. 42° 24', W. 48° 50' passed several icebergs; s. s. "Elysia," in N. 42° 23', W. 51° 03', passed three small icebergs, also loose ice.

4th: S. S. "Dominion," in N. 44°, W. 45°, passed a large iceberg.

7th: S. S. "Erin," in N. 42° 42', W. 49° 40' to 50° 30', passed six icebergs; s. s. "Abyssinia," in N. 42° 33', W. 49° 51', passed thirteen icebergs; ice was first seen in N. 42° 43', W.

49° 51', and last seen in N. 42° 43', W. 50° 42'; ship "Magdalen," in N. 45° 03', W. 45° 40', passed fleet of large icebergs, some of very great size.

8th: S. S. "Amsterdam," in N. 43° 50', W. 44° 30', passed two icebergs.

9th: S. S. "Amsterdam" in N. 42° 25', W. 50° 10', passed several small icebergs; s. s. "City of Brussels," sighted icebergs to the nw., in N. 42°, W. 50°; s. s. "France," in N. 42° 30', W. 51° 05', passed thirteen icebergs; s. s. "Polino," forced through field-ice six miles broad, extending from Newfoundland to Cape Breton. Steamers report that the Cape Breton coast is blocked by ice.

10th: Telegrams from Saint John's state that there are forty-three sailing vessels, and eight steamers caught in the ice in the Gulf of Saint Lawrence; s. s. "Polaria," in N. 42° 59', W. 46° 55', passed a quantity of ice; ship "Magdalene" in N. 43° 09', W. 47° 30', passed three large icebergs.

12th: S. S. "Pieter de Conink," in N. 44° 40', W. 44° 20' to N. 42° 35', W. 48° 00', passed numerous large icebergs.

13th: S. S. "Scythia," in N. 42° 58', W. 48° 22' passed three icebergs; s. s. "Bavarian," in N. 42° 50', W. 50° 00' passed eight icebergs, all of extraordinary height and length; s. s. "Canada" between N. 44° 57', W. 49° 48', and N. 42° 20', W. 51° 05', passed several icebergs.

14th: S. S. "Castor" in N. 42° 03', W. 50° 08', passed numerous icebergs.

16th: S. S. "Donau" in N. 41° 41', W. 49° 04', passed an iceberg.

17th: S. S. "Barcelona" in N. 46° 26', W. 43° 30', passed numerous icebergs.

18th: S. S. "Albingia" in N. 41° 37', W. 48° 37', passed an iceberg; s. s. "City of Lincoln," in N. 44° 10', W. 48° 30', entirely surrounded by icebergs.

19th: S. S. "Bolivia," in N. 45° 35', W. 44° 14', passed several large and small icebergs.

19th: The s. s. "Peruvian," with one thousand passengers on board, is reported as being disabled and locked in the ice at the entrance to the Gulf of St. Lawrence; she lies in a dangerous position and grave fears are entertained for her safety. Several vessels have been sent to her assistance.

20th: S. S. "Bolivia," in N. 43° 12', W. 47° 46', passed several icebergs; s. s. "Herder," in N. 41° 40', W. 54° 23', passed icebergs; s. s. "Strassburg," between N. 42° 31', W. 48° 24', and N. 42° 07', W. 48° 51', passed several large icebergs; s. s. "Scotland," at Montreal, twentieth, reported having been hemmed in by ice in the Gulf for nine days, and only succeeded in getting clear, by passengers and crew cutting an opening.

21st: Sch., "Harry Wetmore," (whaler) reported twenty one ships locked in ice north of Cape Ray, also two ocean steamers between Capes Ray and Anguille; s. s. "Braunschweig," in N. 43° 45', W. 44° 45', passed two large icebergs; same day, in N. 43° 26', W. 45° 00', passed two icebergs eighty and one hundred feet high; s. s. "Nemesis," on the eastern edge of the Banks, passed thirty-six large and small icebergs.

22d: Bark "Nimbus," in N. 44°, W. 46°, sailed two hundred miles through fields of ice and passed several icebergs; s. s. "Braunschweig," in N. 41° 32', W. 43° 34', passed an iceberg 40 feet high; s. s. "Palestine," in N. 42° 26', W. 50° 07', passed two large icebergs and much field-ice; bark "Emile," in N. 43° 42', W. 48° 36', passed hundreds of icebergs and large icefield extending from e. ne. to w. sw.

23d: S. S. "Nevada," in N. 44°, W. 47° to N. 43°, W. 51°, passed ice; s. s. "Oder," in N. 42° 20', W. 49° 09' to N. 42° 04', W. 51° 15', passed four icebergs; s. s. "Schiedam," in N. 43° 27', W. 44° 16', passed several icebergs.

24th: S. S. "Egypt," in N. 41° 19', W. 50° 44', passed large iceberg seventy feet high; s. s. "Jan Breydel," from N. 43° 19', W. 45° 00' to N. 42° 16', W. 48° 52', passed numerous icebergs.

29th: S. S. "Gellert," in N. 41° 57', W. 48° 33', passed large icebergs; s. s. "Ohio," in N. 42° 50', W. 48° 50' to N. 42° 30', W. 50° 31', passed several large and small icebergs.

27th: S. S. "Batavia," between N. 42° 01', W. 49° 15' and N. 41° 47', W. 51° 03', passed several icebergs; s. s. "Caledonia," in N. 42° 38', W. 49° 01', passed numbers of icebergs; s. s. "Habsburg," from N. 42° 32', W. 48° 51' to N. 43° 24' W. 49° 23', passed twenty-three icebergs.

28th: S. S. "Rhyndland," in N. 41° 34', W. 48° 19', passed large iceberg; s. s. "Sidonia," in N. 51° 40', W. 50° 46', passed sixty icebergs, ranging from one hundred to one hundred and fifty feet high; s. s. "Surrey," in N. 42°, W. 50°, passed several icebergs and a quantity of loose ice.

29th: S. S. "Silesia," in N. 40° 03', W. 45° 37', passed an iceberg; brig. "Carita," from Saint Pierre for P. E. I. arrived at Halifax after being eleven days in the ice and found it impossible to reach her destination.

30th: S. S. "City of Paris," in N. 41° 50', W. 48° 14', passed several icebergs; s. s. "Mosel," from N. 42° 40', W. 49° 09' to N. 42° 39', W. 50° 76', passed several icebergs; s. s. "Silesia," in N. 43° 48', W. 53° 00', passed twelve large icebergs.

31st: S. S. "Britannic," in N. 43° 08', W. 46° 31', passed small iceberg; s. s. "City of Paris," in N. 41° 37', W. 50° 25', passed very large iceberg; s. s. "Kansas," from N. 42°, W. 48°, to W. 50°, passed several icebergs and some field-ice.

Captain S. E. Wright, of the s. s. "Carroll," reports, May thirty-first: "Icebound in Halifax harbor since twentieth; the ice has come along the Nova Scotia shore and in sight of the harbor; such was never before witnessed by the oldest inhabitants."

#### TEMPERATURE OF THE AIR.

The distribution of mean temperature over the United States for the month of May, 1882, is exhibited on chart ii. by the dotted isothermal lines. The table of mean comparative temperatures in the lower left-hand corner of the chart, shows the average temperature for the month in several districts as determined from observations taken at Signal Service stations during the month of May for previous years. The second column shows the mean temperature for the current month; the third column shows the departures of the mean of the current month from the mean of several years.

The temperature has been below the mean in all districts except in the north Pacific coast region (where it is about the normal), the greatest departures being as follows: 8°.2 in the upper Mississippi valley; 7°.4 on summit of Mount Washington; 7°.2 in the Missouri valley; 6°.6 in the Ohio valley; 6°.4 in the lower lake region; 5°.6 in New England, the upper lake region and middle slope; 5° in the extreme northwest and 4°.4 in the middle Atlantic states.

#### DEVIATIONS FROM MEAN TEMPERATURE.

Under this heading departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures on the left-hand side of chart ii. The following items of importance, in connection with the subject, are reported by voluntary observers:

*Connecticut*: Southington, mean temperature, 52°.3, or 5°.97 below the average of the past twelve years and lower than for any May during that period; the highest monthly mean, 62°.6, occurred in 1880.

*Indiana*: Riley, mean temperature 50°.9, or 6°.5 below the average of the past twenty-one years. Only May of 1867 was colder than that of the present year. Mean temperature of spring is 1° below the average spring mean.

*Illinois*: Vevay, mean temperature, 62°.4, or 3° below the average of past seventeen years. Maximum temperature, 85° is 5°.65 below the average maximum temperature, and minimum 35° is 9°.06 below the average minimum temperature of the past seventeen years.

*Iowa*: Clinton, mean temperature 53°.5 or 8° below the average.

*Kansas*: Lawrence, mean temperature 60°.27 or 6°.28 below the average of fourteen preceding years; maximum temper-

ature for month, 90°; minimum, 36°.5; the highest maximum during the past fourteen years, 95°, occurred in 1874, '75 and '80; lowest minimum, 30°, occurred in 1875. Wellington, mean temperature 58°.2 is 10°.2 below the average of the three preceding years.

*Maine*: Gardiner, mean temperature 49°.26 or 4°.30 below the average of the past forty-six years, and is lower than for any May during that period; the next lowest mean, 49°.42, occurred in 1837.

*Maryland*: Fallston, mean temperature 55°.39 or 6°.54 below the average of the eleven preceding years. During that period the highest monthly means, 63°.16, 63°.83 and 63°.90, occurred in 1871, '72 and '81, respectively; the lowest monthly mean, 58°.68, occurred in 1877, and is 3°.29 above that of May, 1882.

*Missouri*: Saint Louis, Missouri Weather Service reports: mean temperature about 60°, which is more than 6° below the average of the past forty-five years. The lowest monthly means since 1837 occurred as follows: 60°.5 in 1838; 61° in 1857, and 60° in 1867.

*New Hampshire*: Contoocookville, mean temperature 52°.5, which is the lowest May mean that has occurred during the past eleven years, and is 4° below the average of the same period.

*New York*: Palermo, mean temperature 49°.8 or 5°.1 below the average of past twenty-nine years. During that period the highest monthly mean, 60°.7, occurred in 1880; the lowest, 47°.5, occurred in 1867. Waterburg, mean temperature 50°.4, or 5°.4 below the average of past eleven years. During that period the highest monthly means, 62°.6 and 62°, occurred in 1880 and '81, respectively; the lowest, 53°.1, (with the exception of that of present year) occurred in 1873. North Volney, mean temperature 50°.2, or 5°.47 below the average of past fourteen years. During that period the highest mean, 62°.43, occurred in 1880; the lowest, 52°.37, (with the exception of that of the present year) occurred in 1869. Mean temperature of spring, 40°.34, is 1°.66 below the spring average of the past fourteen years. The lowest spring mean, 38°.35, occurred in 1875; the highest spring mean, 47°.48, occurred in 1878.

*Pennsylvania*: Wellsboro, month the coldest that has occurred during the past ten years. The mean temperature, 50°.5, is 15°.6 below that of May, 1881. During May, 1881, only one frost occurred while fourteen occurred during May, 1882. Dyberry, mean temperature, 48°.4 is more than 2° below the mean of the coldest May that has occurred during the past twenty years, and 15° below the mean of May, 1881.

*Texas*: Clarksville, mean temperature of the month lower than for any May during the past thirteen years.

*Vermont*: Woodstock, mean temperature 50.25 or 3°.77 below the average mean of May from 1868 to 1882 inclusive. During that period the highest monthly mean, 61°.17 occurred in 1880; lowest, 50°.09, occurred in 1873; maximum temperature, 96°.3, occurred May 26, 1880; minimum, 22°.4 occurred May, 7th, 1874.

*Virginia*: Wytheville, mean temperature, 57°.86 or 3°.9 below the average of past nineteen years. The highest monthly mean, 66° occurred in 1880; lowest, 50°, occurred in 1866. The highest temperature reached during the month, 83°, has been equalled or exceeded thirteen times during the past nineteen years, while the minimum temperature, 32°, is the lowest, with the exception of two years, for the same period.

*West Virginia*: Helvetia, mean temperature, 56°.95 or 1°.54 below the average of the past six years.

#### RANGES OF TEMPERATURE AT SIGNAL SERVICE STATIONS.

Monthly ranges of temperature during the month of May varied from 22° to 68° at stations east of the Rocky mountains, and from 25° to 65° at stations on the Pacific coast. The smallest ranges are: Key West, 22°; Galveston and San Diego, 25°; Port Eads, Louisiana, and Punta Rassa, Florida, 26°; Brownsville, Texas, 28°; San Francisco, 29°; Indianola and New Orleans 30°; Pike's Peak, Colorado, and Portsmouth,